

ROLL-VORTEX PLASMA CHEMICAL VAPOR DEPOSITION SYSTEM

ABSTRACT OF THE INVENTION

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A system comprises a processing chamber for maintaining a hydrogen plasma at low pressure. The processing chamber has a long, wide, thin geometry to favor deposition of thin-film silicon on sheet substrates over the chamber walls.

10 The sheet substrates are moved through between ends. A pair of opposing radio frequency electrodes above and below the workpieces are electrically driven hard to generate a flat, pancaked plasma cloud in the middle spaces of the processing chamber. A collinear series of gas injector jets pointed
15 slightly up on a silane-jet manifold introduce 100% silane gas at high velocity from the side in order to roll the plasma cloud in a coaxial vortex. A second such silane-jet manifold is placed on the opposite side and pointed slightly down to further help roll the plasma and maintain a narrow
20 band of silane concentration. A silane-concentration monitor observes the relative amplitudes of the spectral signatures of the silane and the hydrogen constituents in the roll-vortex plasma and outputs a process control feedback signal that is used to keep the silane in hydrogen
25 concentration at about 6-7%.